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(54) Title: LUBRICANT COMPOSITIONS

(57) Abstract

A concentrate is provided which upon dilution with water forms a biocidal lubricant composition for use in lubricating conveyor track. The concentrate comprises the following components: (a) a phosphate ester of general formula (I) in which n is in the range of from 0 to 10 and R_1 is a C_{12} to C_{20} saturated or unsaturated alkyl group or a mixture of such alkyl groups; (b) an aromatic biocidal quaternary ammonium compound; and (c) an amount of base sufficient to give the concentrate a pH of from 5 to 10.

$$R_1-(OCH_2CH_2)_n-O-\underset{\underset{OH}{|}}{\overset{\overset{O}{\|}}{P}}-OH \qquad (I)$$

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LUBRICANT COMPOSITIONS

FIELD OF THE INVENTION

The present invention relates to lubricant compositions, and more specifically to lubricant compositions for use in lubricating the tracks which convey bottles, cans and similar containers and packages for beverages and other foodstuffs from one station to another in a packaging plant.

BACKGROUND OF THE INVENTION

Beverages are sold in a variety of containers such as glass bottles, plastics bottles, plastics containers, cans, or waxed carton packs. These containers are conveyed through a number of stations in a plant where they are filled with the desired beverage; the containers are conveyed from one station to another by a track which is usually of stainless steel when the containers are glass bottles, or of a plastics material such as polypropylene or an acetal resin (sold under the name Delrin) when the containers are other than glass bottles. Such tracks will hereinafter be referred to as "conveyor track".

When the containers are being filled with beverage at a filling station on the packaging plant they are kept at a fixed position under the filling station while the conveyor track continues to move forwards below the container. There are other locations in the plant, e.g., when the container is being closed and sealed, when the container must also be kept stationary while the conveyor track continues to move. In addition, blockage of the path along which the containers are travelling can occur if a container falls over or gets jammed. In such instances it is important that the conveyor track is

properly lubricated so that the track can continue to move even though the containers on the track are temporarily prevented from advancing.

In order to ensure smooth operation of the filling process, it is imperative to ensure that the conveyor track is properly lubricated and cleaned. If the conveyor track is not properly lubricated, the containers can easily fall over or fail to stop moving when they reach the appropriate station in the plant. This can cause serious disruption to the efficient operation of the filling process.

Lubricant compositions which are currently used for lubricating and cleaning conveyor track are generally of three main types:

(i) compositions based on fatty acids,
(ii) compositions based on fatty amines, and
(iii) compositions based on phosphate esters.

A problem encountered with these lubricant compositions is that many known formulations are aggressive to the colouring pigments used to label the surfaces of the containers, particularly steel and aluminium cans used in the beverage industry. The printed matter printed on the surface of the containers has a tendency to leach into the lubricating compositions thereby fading or distorting the printed matter and giving rise to containers unacceptable to customers. Only a few lubricant compositions have been developed with acceptable container-compatibility properties. One is Superloob NF, an oleic acid soap-based formulation sold by Diversey Corporation. Another is Dicolube 95, which is a product described in EP-A-137057.

A further problem encountered with the conveyor track is the need to keep the conveyor and containers as free from microbial contamination as possible. This is especially important where soil spillage occurs, for example spillage of beer, orange juice and cola.

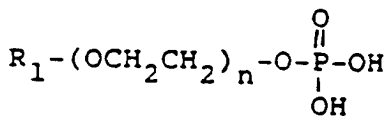
Quarternary ammonium compounds are known generally to have biocidal properties. These compounds have various applications, for example, in disinfectant and cleaning formulations but have hitherto not been used in phosphate ester-containing conveyor track lubricant compositions. One reason for this is that the quarternary ammonium compounds are known to cause precipitation with the known lubricant compositions. This gives rise to compositions which are either impossible to formulate or which are unstable on storage. A further reason for not using quarternary ammonium compounds in conveyor track lubricant compositions is that the quarternary ammonium compounds are highly container-incompatible because they are very aggressive to the colouring pigments used to label the surfaces of containers.

The present applicants have surprisingly found that a lubricant composition for use in lubricating conveyor track can be produced which has biocidal properties and does not leach the printed matter printed on the surface of the containers transmitted on the conveyor track.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided a concentrate which, upon dilution with water, forms a biocidal lubricant composition for use as a lubricant for conveyor track. The concentrate comprises the following components:

(a) a phosphate ester of general formula (I)



(I)

in which n is in the range of from 0 to 10 and R_1 is a C_{12} to C_{20} saturated or unsaturated alkyl group or a mixture of such alkyl groups;

(b) an aromatic biocidal quaternary ammonium compound; and

(c) an amount of base sufficient to give the concentrate a pH of from 5 to 10.

In the phosphate ester the value for n may be integer or non-integer. Non-integer values may arise where mixtures of the esters are used. Preferably, n is in the range of 1 to 5. More preferably n is 3.

Preferred phosphate esters are described in more detail in EP-A-0137057. In this published European patent application, phosphate esters of general formula (I) are described in which R_1 is selected from the group consisting of (i) linear saturated primary alkyl groups, C_{14} to C_{18}, (ii) linear partially unsaturated primary alkyl groups C_{16} to C_{20}, and (iii) a mixture of linear primary alkyl substituents C_{12} to C_{20}, saturated or partially unsaturated, wherein the average length of the alkyl substituent is C_{13} to C_{18}.

According to EP-A-0137057, the presence of the ethoxy groups in the chain of the phosphate ester increases the dispersibility of the ester in water but at some sacrifice in lubricity. Thus, while the lubricant performance of a typical monophosphate ester increases with the length of

the alkyl chain, saturated alkyl groups longer than C_{15} tend to be too insoluble to be easily formulated in the absence of some degree of ethoxylation. Increasing the ethylene oxide content increases solubility but reduces lubricating ability.

Specific phosphate esters disclosed in EP-A-0137057 which are useful in the present invention include those of general formula (I) where R_1 is C_{12}-C_{15} and n = 0 or 3; those where R_1 = C_{14} to C_{15} and n = 0, 2 1/4, or 3; and oleyl phosphate esters of general formula (I) in which R_1 is $CH_3(CH_2)_7CH=CH(CH_2)_7CH-$ and n = 2, or n = 8 to 9.

In a particularly preferred embodiment of the present invention, the phosphate ester is present as a mixture in which R_1 is a mixture of C_{12} to C_{15} saturated alkyl groups. An example of this phosphate ester is sold under the trade name Phospholan PBD-3 by Akros (formerly Lankro) chemicals in which R_1 is C_{12} to C_{15} and n = 3. This particular product contains 65 to 70% by weight of phosphate ester, of which 55 to 60% by weight is the monoester.

Component (a) is typically present in the concentrate in amounts up to 20% by weight, based on the total weight of the concentrate. If the amount of phosphate ester is too great, it becomes difficult to bring into an acceptable pH range. Preferably, component (a) is present in an amount from 2 to 5% by weight, based on the total weight of the concentrate, more preferably around 8% by weight.

Component (b) is preferably a quarternary ammonium compound of general formula (II) $R_2R_3R_4R_5N^+X^-$

in which R_2 is an aromatic group such as an arene or alkyl arene group, preferably a benzyl group; R_3 is a C_{12} to C_{18} straight chain alkyl group; R_4 and R_5 are the same or different and are H or a C_1 to C_4 linear or branched saturated alkyl group, preferably H, methyl or ethyl; and X^- is any suitable counter ion such as halide. In a particularly preferred embodiment, component (b) comprises a compound of formula

$$H_{29}\ C_{14}\ -N(CH_3)\ -CH_2-\ C_6\ H_5{}^+Cl^-.$$

This compound is available commercially under the trade name Empigen BAC from Surfachem or Albright and Wilson. The compound is also available from Hoechst, Cargofleet Cochrane and Keane, British CECA and Akzo under the trade names Dodigen ACX, Caflon BCQ50, Benzalkonium chloride 50%, Noranium DA50 and Arquad B50 respectively.

Preferably, component (b) is present in an amount from 2.5 to 5% by weight, based on the total weight of the concentrate. If the amount of the quarternary ammonium compound is too low, negligable biocidal activity is obtained. Too high a concentration will affect adversely the container compatibility of the composition.

The identity of the base in component (c) of the concentrate is not critical provided that adjustment of the pH of the concentrate into the required range can be effected without affecting adversely the properties of the concentrate. Preferably, an alkanolamine base or an inorganic base of the type MOH, in which M is a metal from Group I of the periodic table is used. Where an alkanolamine base is to be used, this is preferably methanolamine or triethanolamine. The preferred inorganic base is NaOH or KOH. Preferably, the pH of the concentrate is in the range 6 to 9, more preferably around

8. The pH of the concentrate will affect the lubricity of the diluted product in use.

In a preferred embodiment, the concentrate further comprises component (d), which comprises a betaine, preferably a betaine of formula C_{12-14}-$N(CH_3)_2$-CH_2COOH. Whilst betaines are not themselves generally biocidal, incorporation of such betaines in the present concentrate was found to increase the biocidal activity of the quarternary ammonium compound. Preferred betaines are commercially available as Empigen BB, or Genamin KBE-X, sold by Hoechst.

The betaine is typically present in the concentrate in an amount of up to 10% by weight, based on the total weight of the concentrate. Preferably, the ratio of betaine to quarternary ammonium compound is in the range 1:4 to 4:1, preferably around 1:1.

Optionally, the concentrate further comprises component (e), which comprises a sequesterant such as EDTA. The presence of the sequesterant is useful in hard water areas so as to form complexes with metal ions such as calcium ions which would otherwise tend to precipitate components of the concentrate. Typically, the sequesterant is present in an amount of up to 10% by weight, based on the total weight of the concentrate, preferably up to 5% by weight.

The concentrate of the present invention may further comprise further additional components. For example, a non-ionic alcohol may be incorporated into the concentrate composition as a non-ionic surfactant to enhance the wetting and detergency properties of the concentrate.

Typical non-ionic alcohols include ethoxylated alcohols of the type $R_6-(OCH_2CH_2)_mCH_2-OH$ in which R_6 is a C_6 to C_{20} alkyl group and m is in the range 1 to 50. The value of m is selected in accordance with the intended final use of the lubricant composition. As m increases the non-ionic alcohol gives higher detergency but also more foam. Typically, the non-ionic alcohol is present in the concentrate in an amount of up to 20% by weight, preferably 0.5 to 10% by weight, based on the total weight of the concentrate. Synperionic A3 (sold by ICI - C.A.S. registry number 68213-23-0) is a good example of a non-ionic alcohol useful in the present invention. This alcohol has a mixture of C_{13} to C_{15} alkyl groups and m is in the range 2 to 50.

As a further optional component of the concentrate, alcohols or polyols may be used to modify the viscosity of the concentrate. Typically, isopropanol is used for this purpose in an amount of up to 20% by weight, preferably 5 to 15% by weight, based on the total weight of the concentrate.

Hydrotopes may also be present in the concentrate primarily to impart stability to the formulation. A typical hydrotope is urea, which is preferably present in an amount of around 15% by weight, based on the total weight of the concentrate.

The lubricant composition should be able to eliminate or at least control the level of microbial contamination on the slats and undersides of the conveyor. The components of the concentrate which forms the lubricant composition and their respective amounts are selected to achieve a lubricant composition which is biocidal. Some routine

experimentation may be required to optimise this property of the concentrate. For example, it is advantageous not to use a high ratio of betaine to quarternary ammonium compound. Preferably the ratio of betaine to quarternary ammonium compound should be less than 1.

Advantageously, the lubricant composition gives at least a 5 log reduction in a BS3286 test with a contact time of 30 minutes. Preferably, at least a 2 log reduction is achieved in accordance with the surface test described herein. Advantageously, the lubricant composition should be biocidal to at least pseudomonas bacteria such as Pseudomonas aeruginosa, which is capable of forming a slime between the knuckles of the conveyor. This slime is unslightly, a source of unpleasant smell and potential source of product contamination. Depending on the end use of the lubricant compositions, they should preferably also be able to eliminate or at least control growth of yeast and/or listeria. Yeast can be a problem in a brewery environment whereas listeria can be a problem in a diary environment. Preferably the lubricant composition is biocidal against pseudomonas, listeria and yeasts.

The concentrate is made up to 100% using water, preferably soft or softened water. Any conventional formulation technique may be used to make up the concentrate and the order of addition of the components is not particularly critical. Usually the base is added to the phosphate ester and the quarternary ammonium compound is added last.

According to a further aspect of the present invention there is provided a lubricant composition for use as a lubricant for conveyor track. The lubricant composition comprises a concentrate as defined above, diluted in water

in the range 0.1 to 5%, preferably 0.5 to 2% (volume/volume). Water used for the dilution is preferably soft or softened.

The exact dilution of the concentrate depends on factors such as the speed of the conveyor track, the type of package or container being carried by the track, the total loading on the conveyor track and the amount of soiling caused by spillage.

Dilution of the lubricant concentrate is normally performed at a central dispenser, and the diluted lubricant composition is then pumped to spray nozzles at the point of use. There are some areas of the conveyor track that require very little lubricant. Typically these are the zones before the filler and before the pasteuriser. In these regions secondary dilution is often employed. Lubricant is likely to be at its highest use concentration at and after the filler.

The lubricant solutions are typically sprayed onto the conveyor from fan jet nozzles placed at the start of each length of track. For particularly long runs, secondary spray jets may be positioned along the length of the track.

In areas of heavy soiling it may be necessary to spray lubricant onto the track continually. However, in most instances timers are employed to vary the dosing rate. Typically, on and off times will be between 10 and 90 seconds. Off times will not always equal on times. Also it is likely that throughout a plant timer settings will vary.

In some applications, a final water wash jet will be placed at the end of a bottle/can filling track. This will wash residues of lubricant from the package before crating and dispatching.

Excess lubricant will be allowed to fall from the track either to the floor or suitable drip trays. In either event it will eventually enter the drainage and water treatment systems.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is illustrated by the following Examples.

The Examples are presented in Table 1 which shows the effect of various formulations on listeria and pseudomonas in the presence or absence of milk soil. The results are presented as a log reduction in the number of viable cells comparing bacterial cultures before and after contact with the lubricant composition in accordance with the modified BS3286 test described in further detail below. It will be apparent that the formulations of Examples 1 and 2 are not particularly effective against listeria. This may be explained by the relatively extreme pHs of these formulations. However, these Examples do show a favourable pH range of about 8 to 10 for effectiveness against pseudomonas. The effectiveness of the formulation of Example 14 is apparently reduced because of the relatively high ratio of betaine to quarternary ammonium compound.

Bacterial Studies on Phosphate Ester Formulations

TABLE 1

Concentration 0.5% v/v	Ex. / Time (mins)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Listeria	10	<0.36	0.75	1.29	>5.5	>5.5	>5.5	>5.5	>5.5	1.70	>5.5	>5.5	>5.5	>5.5	<0.36	>5.5	<0.36	>5.5
Listeria	30	<0.36	<0.36	4.45	2.54	>5.5	>5.5	>5.5	>5.5	>5.5	>5.5	>5.5	>5.5	>5.5	<0.36	>5.5	1.93	>5.5
Listeria + 1% milk soil	10	<0.36	<0.36	<0.36	>5.5	>5.5	>5.5	>5.5	>5.5	<1.0	>5.5	>5.5	<0.36	0.54	<0.36	>5.5	0.86	>5.5
Listeria + 1% milk soil	30	<0.36	<0.36	<0.36	>5.5	>5.5	>5.5	>5.5	>5.5	<1.8	>5.5	>5.5	<0.36	2.34	<0.36	>5.5	1.97	>5.5
Pseudomonas	10	1.44	>5.5	>5.5			>5.5									>5.5		
Pseudomonas	30	<1.56	>5.5	>5.5		>5.49	>5.5	>5.49								>5.5		>5.49
Pseudomonas + 1% milk	10	<1.56	>5.5	>5.5			>5.5									>5.5		
Pseudomonas + 1% milk	30	<1.56	>5.5	>5.5	-	1.08	>5.5	1.11								>5.5		1.17
Phospholan PDB-3		8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	4.00	4.00	8.00	8.00	8.00	8.00	8.00	8.00
Isopropanol		-	-	-	0.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	-	12.00
Synperonic A4		-	-	-	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Methanolamine		pH 5	pH 10	pH 8	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
EDTA 65%		-	-		2.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.00	1.00	1.00
Urea		10.00	10.00	10.00	15.00	15.00	15.00	15.00	15.00	15.00	7.50	7.50	15.00	15.00	15.00	15.00	15.00	7.50
Benzalkonium chloride		2.50	2.50	2.50	2.50	5.00	5.00	5.00	5.00	2.50	5.00	2.50	2.50	2.50	2.50	2.50	5.00	5.00
Empigen BB		-	-	-	-	1.25	1.80	2.50	-	-	-	-	0.75	1.25	2.5	-	-	
pH		5	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Results given as log reduction against Listeria monocytogenes/Pseudomonas aeruginosa in accordance with modified BS3286 test. The formulations of Examples 5 and 14 gave a > 5.5 log reduction against yeast with a contact time of 24 hours.

All quantities of components in formulations given as weight %, water making up the balance.

The formulations of Examples 6 and 15 were found to be particularly good. These formulations gave high biocidal activity against all three microorganisms tested. These formulations were also found to give good biocidal activity in the surface test described below. These formulations also passed the can compatibility test.

Biocidal Activity Screening

The biocidal activity tests described above were carried out in accordance with BS3286 with a single modification. The BS3286 test involves preparation of a suspension of the microorganism for evaluation and the suspension is added to the composition to be tested. Following elapse of a chosen contact time, 1 ml of the mixture is added to a neutraliser solution so as to neutralise the microbicidal effect of the composition being tested. A sample of the neutralised mixture is plated to determine the microorganism concentration remaining.

The composition of the neutraliser used in the tests described in the present specification was modified so as to be effective against the range of lubricant compositions tested.

The neutraliser was made by mixing soy lecithin (30 g), Tween 80 (100 g) and water (500 ml) so as to suspend the lecithin. To this suspension was added sodium thiosulphate (5 g), histidine (1.0 g), Na_2HPO_4 at 0.2 M (144 ml), NaH_2PO_4 at 0.2 M (56 ml) and water to make 1000 ml. This mixture was autoclaved at 121°C for 15 minutes and mixed whilst still hot to resuspend the Tween 80.

Surface Test

The aim of this test is to assess the action of biocides against microorganisms attached to a solid surface.

A suspension of Pseudomonas aeruginosa (NCIMB) 10421 was prepared by innoculating Tryptone Soya Broth (OXOID CM 129) (150 ml) with a loopful of culture from a 24 hour old slope. After stirring at room temperature for 16 to 18 hours, 40 ml of suspension was removed, spun, washed and resuspended in phosphate buffer (KH_2PO_4, 0.1 M and distilled water (500 ml adjusted to pH 7.0 $\pm$ 0.1 and made to 1000 ml) to give a cell count of approximately 10^9/ml. The sterilised stainless steel discs were prepared and covered with the suspension and left for 1 hour to allow initial attachment of the bacteria. The suspension was replaced with peptone growth medium (neutralised bacteriological peptone (OXOID L 34) (1 g in 1000 ml distilled water)) and left for 4 hours. The discs were then removed, drained of excess liquid dried for 15 minutes under laminar air flow.

The dried discs were then placed in a sample of the lubricant composition under test. After the contact time specified, each disc was then removed, excess liquid drained and then swabbed with neutraliser as used above. Swabs were then analysed for bacterial concentration in accordance with the BS 3286 test by mixing with the BS 3286 diluent to release the bacteria and subsequent plating out on Tryptone Soya Agar. Log reduction could then be determined by comparison with water.

All solutions were prepared sterile by autoclaving at 121°C for 20 minutes.

Formulations in accordance with Examples 6 and 15 were subjected to the surface test with a contact time of 30 minutes using a 1% solution of the concentrate in water. A log reduction under the modified BS3286 test of 2.82 was found for the formulation of Example 6 and a log reduction of 2.5 was found for the formulation of Example 15.

Can Compatibility Test

The compatibility of the lubricant compositions against inks typically used on cans was evaluated on ink coated test panels obtained from a proprietary pigment manufacturer. Emphasis was placed on red pigments which are notoriously susceptible to fading. Tests were carried out on strips of the material under the following conditions:

Use conditions - 1% v/v solution at ambient temperature for 3 hours

Abuse conditions - up to 10% v/v at 37°C for 3 hours.

The formulations of Examples 6 and 15 gave rise to an ink fade which was only slightly inferior to that of the phosphate ester by itself but at least as good as that obtained for a conventional fatty acid based formulation (Superloob NF).

Track Lubrication Tests

The lubricity and durability of the lubricant composition was measured on a pilot test track, approximately 19 cm wide by 240 cm long. The track comprised a slat conveyor manufactured of 304 stainless steel and was operated at a speed of 60 cm per second. Friction measurements were measured with a 0-2 kg load cell manufactured by Poiden controls. The output from the load cell was connected to a variable speed strip chart recorder, permitting measurements of coefficient of friction (u) verses time. A constant load, consisting of 4 filled bottles connected to the load cell by a loop of nylon thread, was utilised in these experiments. Lubricant compositions were applied in spurts on the test track via a feed pump, through a fan spray nozzle. The pump and nozzle could be adjusted to vary both the frequency of the spurts and the volume of material delivered. In each case a solution volume of 100 ml/minute was achieved with a spurt rate of 13/minute.

The test was initiated by activating the feed pump and starting the test track and recorder motion. The measured coefficient of friction was observed to drop over a period of time to a constant equilibrium value (u), the value depending on the lubricity of the applied material. Because lubricity has an inverse relationship to friction, the lower the value of u the better the lubricant.

The pilot test track was also used to meausre the durability of the lubricant compositions. This was accomplished by replacing the intermittent stream of lubricant applied to the track with a constant steam of water. At the same time 16 filled bottles (total weight 14.5 kg) were placed on the track to increase the wear

rate. The time required for the coefficient of friction to increase from the lubricated equilibrium value to the original friction value represented the durability of the lubricant. The greater the time, the better the durability.

The reported data for coefficients of friction represent figures taken 20 minutes after the initial activation of the feed pump and test track to ensure that a constant equilibrium has been obtained. Immediately after making the measurement, the flow of lubricant was replaced with the water stream and the durability test was commenced.

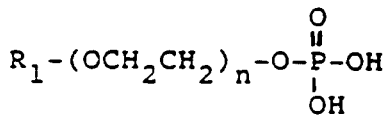
When tested under the above conditions a formulation of phosphate ester in the absence of any quarternary ammonium compound would have an expected u value of around 0.15 and a durability of around 5 minutes.

When tested under the same conditions, the formulations of Examples 6 and 15 showed that the addition of the quaternary ammonium compound did not alter these figures.

CLAIMS:

1. A concentrate which upon dilution with water forms a biocidal lubricant composition for use in lubricating conveyor track, the concentrate comprising the following components:

(a) a phosphate ester of general formula (I)



(I)

in which n is in the range of from 0 to 10 and R_1 is a C_{12} to C_{20} saturated or unsaturated alkyl group or a mixture of such alkyl groups;

(b) an aromatic biocidal quaternary ammonium compound; and

(c) an amount of base sufficient to give the concentrate a pH of from 5 to 10.

2. A concentrate according to claim 1, wherein component (a) comprises the phosphate ester of general formula (I) in which R_1 is a 1:1 mixture of C_{14} and C_{15} saturated alkyl groups.

3. A concentrate according to claim 1 or claim 2, wherein component (a) comprises the phosphate ester of general formula (I) in which n is in the range of from 1 to 5.

4. A concentrate according to any one of claims 1 to 3, wherein component (a) is present in an amount of from 2 to 15% by weight, based on the total weight of the concentrate.

5. A concentrate according to any one of the preceding claims, wherein component (b) comprises a quaternary ammonium compound of general formula (II) $R_2R_3R_4R_5N^+X^-$ in which R_2 is an aromatic group, R_3 is a C_{12} to C_{18} straight chain alkyl group, R_4 and R_5 are the same or different and are H or a C_1 to C_4 linear or branched saturated alkyl group, and X^- is a counter ion.

6. A concentrate according to claim 5, wherein component (b) comprises a compound of formula $H_{29}C_{14}-N(CH_3)-CH_2-C_6H_5^+Cl^-$.

7. A concentrate according to any one of the preceding claims, wherein component (b) is present in an amount from 2.5 to 5% by weight, based on the total weight of the concentrate.

8. A concentrate according to any one of the preceding claims, wherein component (c) comprises an alkanolamine base or MOH, in which M is a metal from Group I of the periodic table.

9. A concentrate according to any one of the preceding claims, which further comprises component (d), which comprises a betaine.

10. A concentrate according to claim 9, wherein 10omponent (d) comprises a betaine of the formula $C_{12-14}-N(CH_3)_2-CH_2COOH$.

11. A concentrate according to claim 9 or claim 10, wherein component (d) is present in an amount of up to 10% by weight, based on the total weight of the concentrate.

12. A concentrate according to any one of the preceding claims, which further comprises component (e), which comprises a sequesterant.

13. A concentrate according to claim 12, wherein component (e) comprises EDTA.

14. A concentrate according to claim 12 or claim 13, wherein component (e) is present in amount up to 5% by weight, based on the total weight of the concentrate.

15. A lubricant composition for conveyor track comprising a concentrate according to any one of the preceding claims diluted with 95 to 99.9 parts by volume of water.

16. A lubricant composition according to claim 15, wherein the concentrate is diluted with from 98 to 99.5 parts by volume of water.

INTERNATIONAL SEARCH REPORT

Int. onal Application No
PCT/GB 95/01641

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C10M173/02 //(C10M173/02,125:10,133:06,133:08,133:12,137:04, 153:04),C10N30:16,C10N40:00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C10M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO-A-92 13048 (ECOLAB INC.) 6 August 1992 see claim 1 see page 11, line 9 - line 17 see page 12, line 4 - line 9 see page 15, line 5 - line 6	1,4-8, 12-16
Y	EP-A-0 359 145 (HENKEL KOMMANDITGESELLSCHAFT) 21 March 1990 see page 2, line 54 - page 3, line 21	1,4-8, 12-16
A	US-A-4 839 067 (G. JANSEN) 13 June 1989 see column 3, line 3 - line 9	1,5,6,8

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
18 October 1995	24.10.95.

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Hilgenga, K

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	DATABASE WPI Section Ch, Week 9014 Derwent Publications Ltd., London, GB; Class D22, AN 90-104332 & JP-A-02 055 794 (ASAHI CHEMICAL IND KK) , 26 February 1990 see abstract	9,10
A	WO-A-93 18121 (HENKEL KOMMANDITGESELLSCHAFT) 16 September 1993 see page 8, line 19 - line 21	9-11
A	US-A-3 718 588 (T.J. BELLOS) 27 February 1973 see column 3, line 61 - line 64 see column 4, line 45 - line 58 see column 5, line 75 - line 13	1,12,13
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